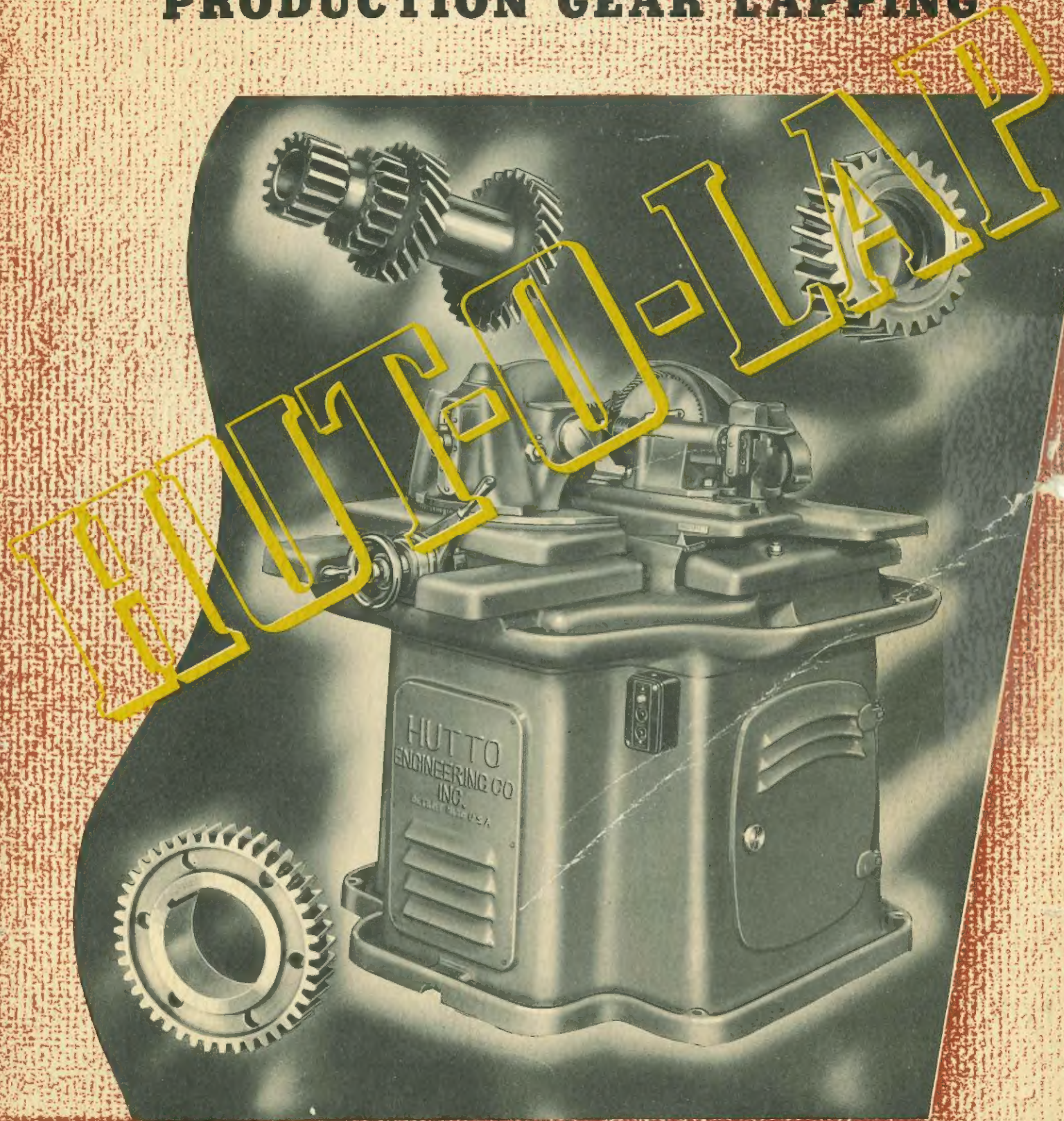


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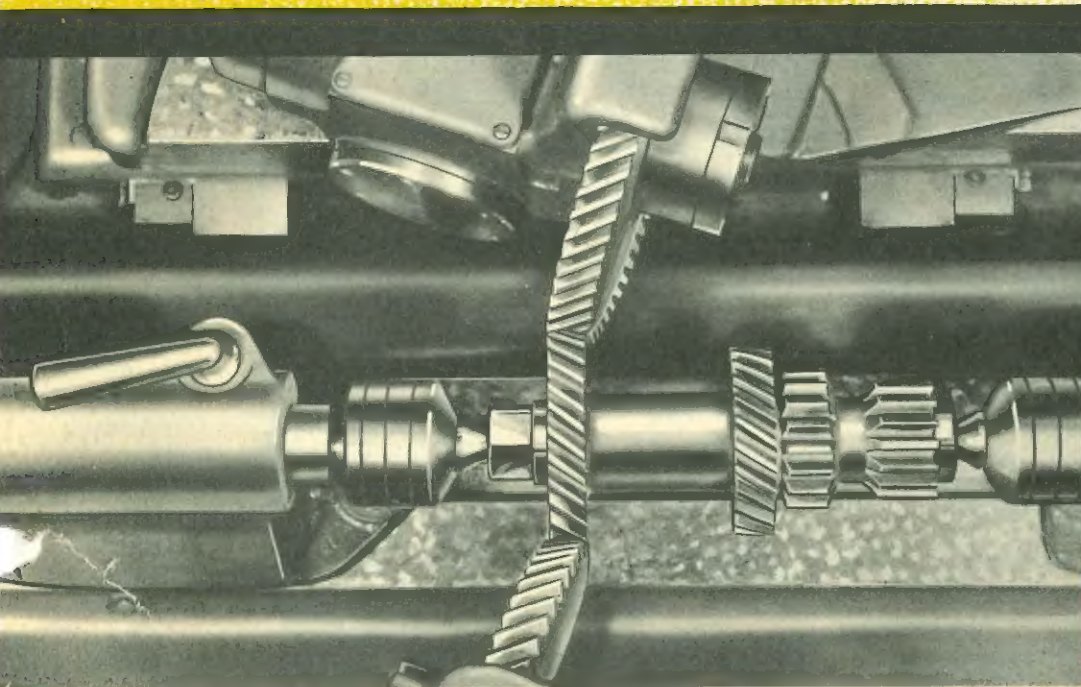
# A NEW AND REVOLUTIONARY DEVELOPMENT IN ACCURATE PRODUCTION GEAR LAPPING



## FOR SPUR, HELICAL AND HERRINGBONE GEARS



# THE HUT-O-LAP MACHINE EMBODIES A NEW INCLINED AXIS PRINCIPLE OF LAPPING . . .



*The Hut-O-Lap "Inclined Axis" principle is here shown in graphic detail. The work piece is identified as the gear cluster between the two lapping members on "inclined axes." Complete and thorough lapping action, accompanied by meshing accuracy.*

A revolutionary and distinctly new method of gear lapping has been developed by the Hutto Engineering Company, Inc., Detroit, which now makes possible the lapping of heat treated gears to an entirely new degree of tolerances. The method employed in accomplishing this amazing advance in gear lapping is known as the "Inclined Axis" principle. For the first time quieter, smoother gear operation, together with correct tooth contact and freedom from gear lapping evils, including destruction of tooth profile, have been achieved. The Hut-O-Lap method accomplishes these long-sought results by inclining the axes of the lapping members to the work piece in such a manner that the normal line of rolling contact is transferred from one parallel to the axis of the work piece to one which diagonally intersects the conventional pitch line. See right hand diagram which illustrates this principle. This inclination of the lapping members results in a transference of the attendant sliding action both above and below the transferred lines of rolling contact . . . subjects the conventional pitch line to a sliding action from the point of intersection of the transferred line toward the face extremities of the gear tooth flanks. In this manner, frictional or abrasive action is produced along the normal pitch line of the gear tooth by rotary motion only . . . without increasing the sliding movement between the other contacting portions of the gear teeth. The Hut-O-Lap machine thus produces a far more thorough lapping action throughout the entire gear tooth surface—insures vastly superior results in every phase of the gear lapping operation. These superior features, combined with uncanny uniformity of results, make the Hut-O-Lap machine an outstanding contribution to the faster, more economical production of smoother, quieter, more efficient gears—so essential to the present day needs of higher speeds and greater torque loads.



Diagram illustrating the manner in which the normal line of rolling contact (Y-Y) is transferred to a new position (X-X) by means of the "INCLINED AXIS" principle of lapping. The normal line of rolling contact of the work piece teeth is thereby subjected to a sliding action without subjecting the other portions of the tooth to additional abrasion.

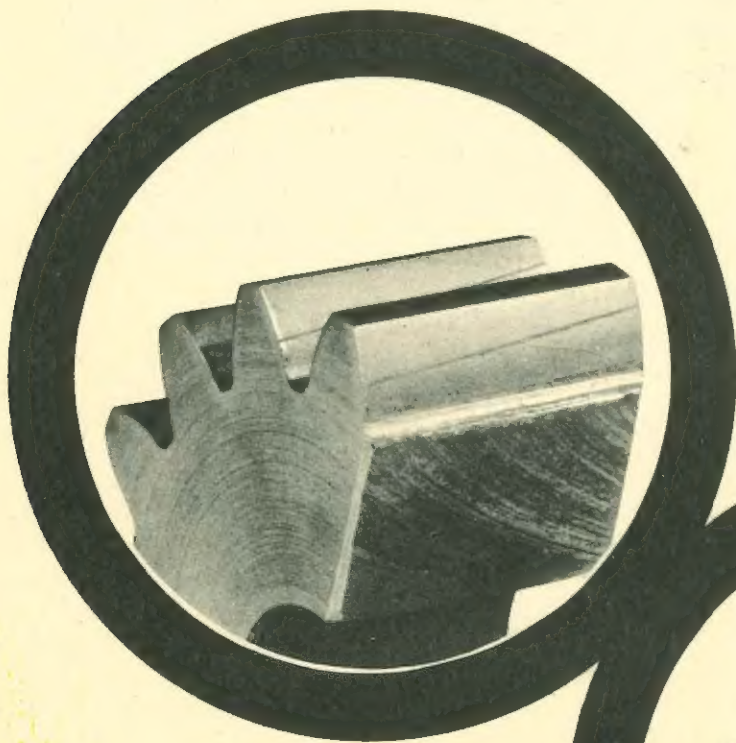


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# IT SUPERSEDES ALL PREVIOUS METHODS OF GEAR LAPPING

Because of its advanced design and superior ability, the Hut-O-Lap "Inclined Axis" principle of gear lapping definitely obsoletes all previous methods of lapping gears. Former running-in methods have had the disadvantage of a relatively un-uniform abrading action over the entire tooth face—with an excessive abrasive or sliding action occurring above and below the conventional pitch line. This has been definitely overcome in the Hut-O-Lap "Inclined Axis" method, in which the lapping member and work piece are singularly disposed in one plane and parallel in the other. This results in (1) A full face contact, extremely beneficial in correcting helix angle and bearing wobble; (2) An inherent sliding action between the contacting surfaces of lap and work piece teeth along the conventional pitch line as a result of rotation of the members in inclined planes; (3) The full benefit

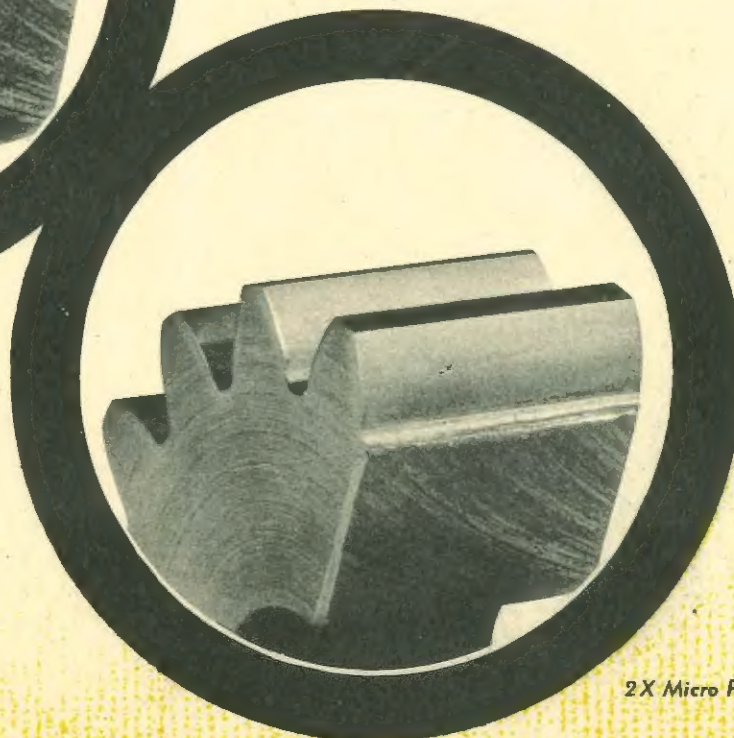
derived from any "running-in process" for correcting eccentricity and index error; (4) The advantage of lapping one or more gears on a cluster simultaneously without adding to operation cost; (5) A definite reduction in lapping time because of larger area of tooth contact. These outstanding features in Hut-O-Lap gear lapping machines bring you the last word in speed, efficiency and economy for any and every gear lapping operation on spur, helical and herringbone gears.



2X Micro Photograph

The top circular illustration represents an actual unretouched photograph of a gear tooth lapped by the Inclined Axis" method through the use of rotary motion of the work in one direction only. This clearly defines the abrasive action produced over the normal pitch surface of the tooth.

The lower photograph illustrates the result of the Inclined Axial method of lapping produced by both directions of rotary motion through the use of reciprocating motion and in conjunction with the rotary motion, the angular lines of rolling contact become less and less defined and may be entirely eliminated though the abrasive action obtained thereby still exists.



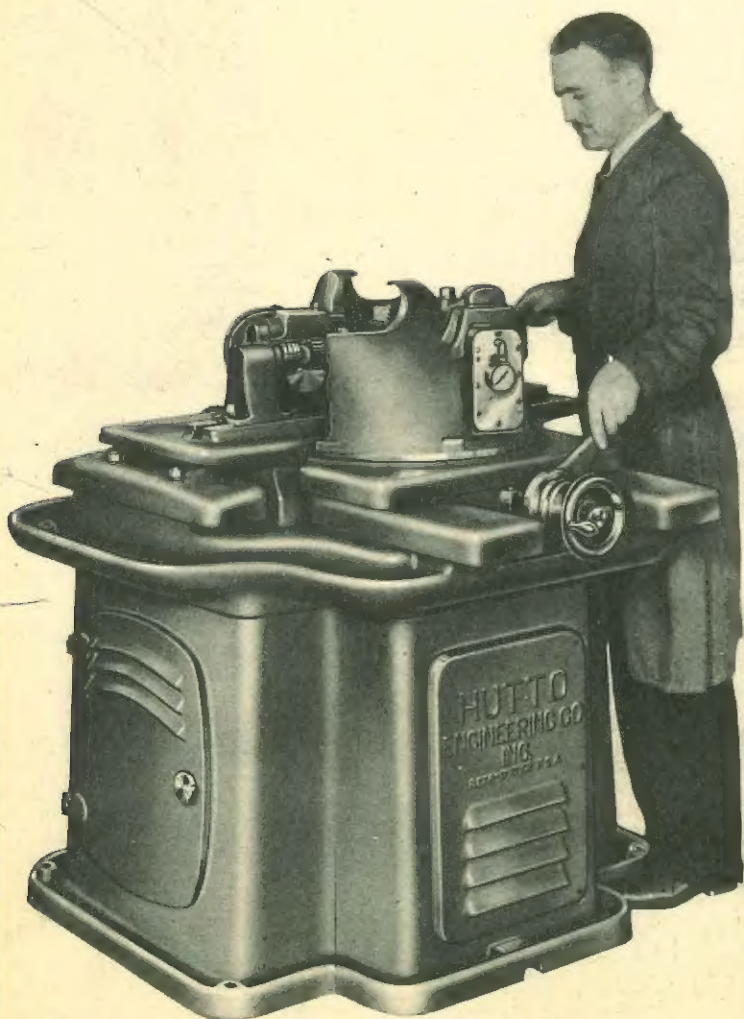
2X Micro Photograph





# HUT-O-LAP MACHINES BRING YOU AUTOMATIC OPERATION . . . COUPLED WITH UNRIVALED ACCURACY

*Compactness, simplicity of operation and ruggedness of design are well illustrated in this view of the new Hut-O-Lap "Inclined Axis" gear lapping machine. Once set, the lapping operation is entirely automatic, requiring the attention of the operator only for inserting and removing the work pieces.*



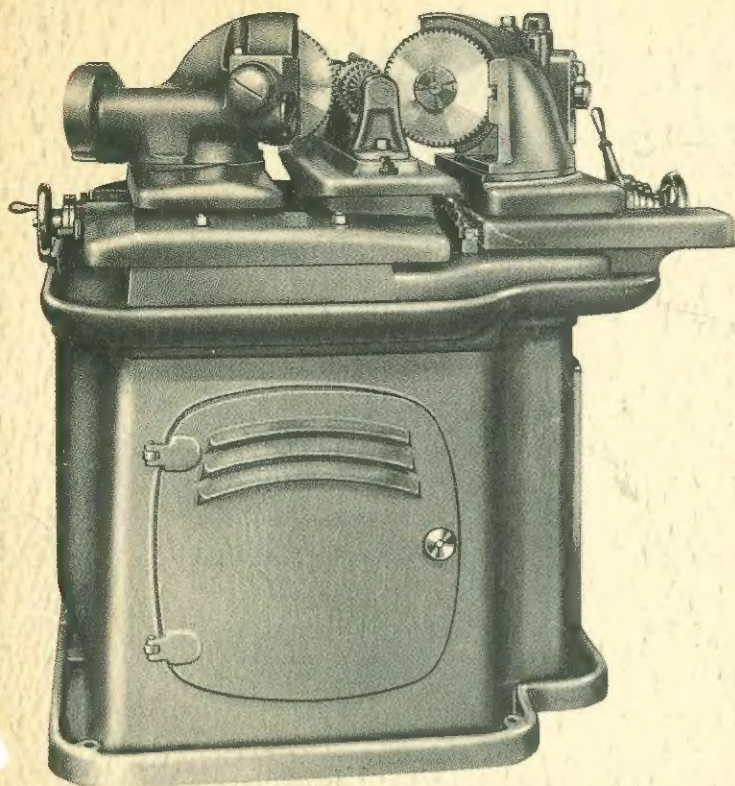
Prominent among the outstanding features of the Hut-O-Lap "Inclined Axis" gear lapping machines is their complete automatic operation . . . with variable rotating speeds and adjustable reciprocating stroke controlled through an ingenious electrical timing device. This mechanism makes possible pre-determined rotating and reciprocating speeds to suit the particular gears to be lapped . . . permits one operator to attend to a battery of machines at one time. . . . eliminates the element of human error. By offering the possibility of multiple laps . . . by greatly increasing production capacity, Hut-O-Lap machines spell added economy to every manufacturer faced with the problem of finishing heat treated gears to meet today's demands for increased accuracy, quieter operation and longer life. Hut-O-Lap "Inclined Axis" gear lapping machines bring a new degree of performance to every phase of gear lapping. The former need for gear selection and mating is decidedly minimized; "crowned" tooth faces may be produced as easily and as readily as "straight" because the "Inclined Axis" method—unlike conventional lapping machines—employs a comparatively slow longitudinal reciprocating motion, which is not used to produce lapping action but is solely for the purpose of uniformly distributing the abrading effort over the *entire* face of the gear tooth. Finer, more accurate, more efficient, more economical gear lapping machines have never been built. We mean it! Compact, rugged construction, anti-friction bearings throughout, also in work slides; all moving parts amply protected from all foreign matter; rotary and reciprocating motions individually driven; unique hydraulic, trouble-free, variable pressure lap brake; automatic cycle timing mechanism, fully adjustable, insure an efficient, accurate, sturdy, long-lived, inexpensive unit. If you are interested in getting superior performance while actually lowering costs . . . if you would know the ultimate in gear lapping production possibilities . . . then don't fail to investigate the new Hut-O-Lap "Inclined Axis" machine. It is everything we say and more! It represents a tremendous step forward in manufacturing progress. It is a modern triumph of engineering design.



# QUICK FACTS

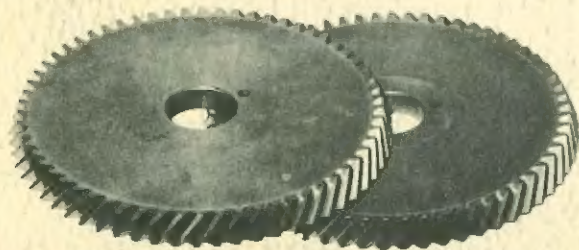
1. By inclining the axis of the lapping member with relation to that of the work piece in such a manner that the normal line of rolling contact is transferred from one that is parallel to the axis of the work piece to one which diagonally intersects the conventional pitch line, the Hut-O-Lap "Inclined Axis" method of gear lapping results in complete lapping action throughout the *entire* gear tooth height and width . . . insures vastly superior results in every phase of the gear lapping operation.
2. Full automatic control, together with easy accessibility to both the work piece and lapping members result in greatly increased lapping production . . . reduced lapping time . . . and simplified operation.
3. Hut-O-Lap "Inclined Axis" machines are simple, sturdy and efficient in design . . . require greatly reduced operating time to achieve superior lapping results. Features of design enable one man to attend a battery of machines.
4. The "Inclined Axis" method readily makes possible the simultaneous lapping of more than one gear member such as a cluster or herringbone gear. Hut-O-Lap machines are easily adaptable to the accurate, economical finishing of any type cylindrical gears, whether spur, helical or herringbone.
5. The greater accuracy obtained with Hut-O-Lap machines, combined with their consistent uniformity of results decidedly eliminate the necessity for gear selection and mating.
6. The Hut-O-Lap "Inclined Axis" principle of gear lapping is acclaimed by engineers as the most efficient, most effectual method known for the correction of such long standing gear evils as bearing wobble, end bearing, cross bearing, profile distortion, index error and eccentricity.
7. The principle of this method can be adapted to internal gear lapping.





## A MODERN TRIUMPH OF ENGINEERING DESIGN

Hut-O-Lap machines combine adjustable, full automatic forward and reverse rotating speeds and reciprocating speeds with simple, sturdy design . . . easy accessibility to all working parts . . . ready adaptability to any type spur, helical or herringbone gear—single or in combination clusters. These features combined with the outstanding results achieved by the "Inclined Axis" principle bring to every manufacturer with a gear lapping problem new accuracy, new efficiency, new economy and new uniformity in gear tooth precision. We urge you to investigate the new Hut-O-Lap "Inclined Axis" gear lapping machine—see for yourself why its pre-eminently superior service in every phase of the gear finishing process offers a definite solution to your production problems.



*Hut-O-Lap lapping gears are specially designed to serve the needs of the Inclined Axis principle of gear lapping.*

## DEVELOPED BY THE PIONEERS OF PRO- DUCTION HONING

The Hutto Engineering Company has long enjoyed the reputation of being the country's first and foremost organization devoting its entire facilities to the manufacture of precision honing and grinding equipment. Hutto cylinder grinding and honing machines are found in the factories of manufacturers of automobiles, diesel engines, electric refrigerators, etc. . . . are the first choice of the United States Army and Navy where precision is required. From this background of experience and long association with the practical problems of correctly finishing metal surfaces with abrasives, we bring you the Hut-O-Lap "Inclined Axis" gear lapping principle . . . a method so revolutionary, yet so practical in its application as to eventually cause the complete discard of all former conceptions of gear lapping practice.

### SPECIFICATIONS CAPACITY

Maximum O. D. of work	8 inches
Maximum length of work; gear being positional any- where in length	12 inches
Maximum O. D. of lap	9 inches
Maximum travel of reciprocating stroke	5 inches

### DIMENSIONS

F. to B.	52 inches
R. to L.	48 inches
Overall height	48 inches
Height of work centers from floor	42 inches
Cubic displacement, packed for shipment (approx.)	52" x 52" x 57"
Net weight	3100 lbs.
Shipping weight	3400 lbs.
Foreign shipping weight	3600 lbs.

*Received October 11, 1935*  
*L. M. Swingle*

**HUTTO ENGINEERING COMPANY**

515 Lyncaste Avenue

DETROIT

Michigan

LITHO IN U.S.A.